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Domestic Fuel Policy

A document of fundamental importance to that section of the foundry industry engaged in domestic fuel appliance manufacture, is the Report of the Fuel and Power Advisory Council, as it discloses the future intentions as to the type of apparatus which firms will be expected to produce. At the moment, householders are consuming 50 million tons of bituminous coal, with a working efficiency of 20 per cent. It is suggested that in 20 years' time this should be replaced by solid smokeless fuel, or bituminous coal burnt smokelessly, or by gas or by electricity, with an average coal efficiency of not less than 40 per cent. Such a change would give a smoke-free atmosphere in residential areas and a saving of the order of 10 million tons of coal per annum. Our interpretation is that gradually the open coal fire, as we know it, will disappear.

Already, an expanding range of enclosed stoves is finding its way on to the market. If the overall efficiency of 40 per cent. is to be attained, the major improvement must be sought amongst the solid fuel-burning type, as gas and electric stoves have to a large measure their efficiency controlled for them by the gasworks and generating stations.

The Report makes the following recommendations, all of which affect the future of the foundry industry : —

(*a*) The Government should encourage the production of improved heating appliances for all fuels and for all domestic purposes.

It is particularly important to develop multi-fuel appliances to burn efficiently and as smokelessly as possible both bituminous coal and smokeless solid fuels.

(*b*) Minimum standards should be established as soon as possible for all leading types of appliances.

(*c*) The manufacture and sale of new appliances falling below approved standards should be prohibited as soon as practicable.

(*d*) The Government should take steps to ensure that the codes of practice on heating and ventilation installations should be effectively adopted in all new houses.

(*e*) The Government should be responsible for ensuring the proper type testing of appliances, and that the organisation should be rapidly developed to enable it to perform this work without causing delay to manufacturers in introducing new appliances.

(*f*) The Government should take steps to secure the mass production of standardised domestic fuel appliances.

(*g*) The Government should make every effort to secure the installation in all new houses of approved appliances for winter space and water heating to burn smokeless solid fuels or to burn bituminous coal with a minimum of smoke.

(*h*) In subsidised houses, the Government should make the use of approved solid fuel appliances a condition of subsidy, and should consider the advisability of a free issue of such appliances as part of the subsidy.

(*j*) Old-fashioned coal grates in existing houses should be replaced wherever practicable by new approved appliances. Subsidies should be granted by the Government to encourage widespread and rapid action on these lines.

Next, the Report makes some half-dozen recommendations which will act as a pointer to the repartition of the stove business within the industry of which we extract those of direct interest.—

(1) The main winter space and water heating load should be taken by solid fuel.

(2) Intermittent space and water heating for short periods should be taken by gas and electricity.

(3) Subject to (1) and (2) the domestic heating field should be left for free competition between the various fuels.

(4) It should be the policy of the Government to replace bituminous coal in all single house appliances by smokeless solid fuel as rapidly as adequate supplies can be provided at a reasonable price.

Large blocks of flats and large houses are to be centrally heated, whilst in rural areas, every effort is to be made to make electricity available. Encouragement is to be given " the formation of an effective sales and maintenance organisation for the solid fuel industries." Surely—though badly expressed—this means the makers of the stoves?

In the section on " gas and electricity " the Council—*inter alia*—recommends : —

(*a*) Free competition should continue between gas

(*Continued at foot of next page.*)

DISTRIBUTION OF INDUSTRY

By F. J. TEBBUTT

The Board of Trade, by the Distribution of Industry Act, 1945, is given power to acquire land (by agreement or compulsorily) for the purpose of providing industrial premises (whether by the Board or other persons) and means of access, and can erect such buildings and carry out such work on land held by the Board as is necessary and render the land suitable for the provision of premises, etc., by other persons. This power covers the provision of offices and canteens, etc., and also houses for certain workers (*e.g.*, key workers from other districts).

If a Trading or Industrial Estate Company can further the establishment or expansion of industrial undertakings by the provision of premises, the Board can make loans to such a company; these companies are non-profit-making concerns (capital mostly found by the Government) formed to provide industrial premises for use, not by the particular company, but by other persons.

Basic Services

Where it is considered that there are not adequate "basic services," the Government department responsible for the particular service (the term "basic service" covers the provision of facilities for transport whether by road, rail, water or air, or of power, lighting and heating, and housing, health, or other services necessary for industrial undertakings) can make grants or loans towards the cost of improving any such service. This provision would allow a local authority to bring up any basic service to a proper level without raising the local rates, a matter of importance to industrialists thinking of opening out in the district.

Whether the undertaking is one already established or one proposed, the Act allows the Treasury (an Advisory Committee looks into the matter) to give financial assistance, either by annual grants towards the cost of paying interest on moneys borrowed or to be borrowed for the purposes of the undertaking or generally for those purposes, or by loans. The prerequisite is really that there are good prospects of the concern being ultimately able to function successfully, but for the time being it cannot obtain the necessary capital on requisite terms, without help in this way.

Derelict Land

The Board of Trade can acquire derelict land and can carry out such work as is expedient for making it fit for use and can make grants to a local authority or non-profit-making company towards the cost of bringing derelict land into a proper state for use. This power will be useful for clearing up land with anything unsightly left by a former concern, removing pit heaps, and so forth, the state of the property being such as to discourage any industrialist thinking of starting operations in the district. Incidentally, it may be useful to mention that in law, the term "land" includes buildings, unless there is specific mention in the enactment in question, and does not mean just "land" in its plain sense.

The foregoing only applies to what are known as development areas (districts spread over Great Britain), which, however, cover quite six million inhabitants, the districts being scheduled in the Act. But the Board of Trade can, if there is likely to be a special danger of unemployment, add any other area, just by Order, but such an Order must be approved by both Houses of Parliament. After June 15, 1948, the Board must consider whether there should be additions to or subtractions from the Schedule, any alteration similarly being made operative by an Order as just mentioned.

Points to Note

Applying everywhere throughout Great Britain and not just to the areas as above, an important provision makes obligatory the notification to the Board of Trade of the intention of a person to erect a new industrial building, at least sixty days before a contract is entered into or building started. If not given in the notification, the Board can require such information as the proposed situation of the building, the process to be carried on, the estimated aggregate floor space and the number of men and women likely to be employed therein. The provision does not apply, if the floor space of the proposed building does not exceed 10,000 sq. ft., neither does it if the building is contiguous or adjacent to another industrial building of the same concern—erected before June 15, 1945—or it replaces such another industrial building and is erected on the same site or one contiguous or adjacent.

An important point is that while this notification procedure is obligatory under penalties (fine can be anything up to £100), the Board has no power under this Act to prohibit building operations after the lapse of sixty days; of course, if the Board is in agreement with the firm there is nothing to prevent the firm starting before the end of the sixty days. But the foregoing notwithstanding, there are wartime Orders which require a Building Licence in such circumstances, so there is really power of prohibition by these rules, if not by the Act. During the progress of the statute through Parliament, however—the measure is one of the late Coalition Government—Government spokesmen emphasised that the real reason of this notification requirement was so that there can be consultation between the Board and the party concerned, in pursuit of the objects of the Act, namely, the distribution of industry, and it was stated that the Board could impart useful information concerning the labour available in any district and whether suitable for the industry concerned, particulars of public services, lighting, power, water, access, transport facilities and so forth.

(*Concluded from previous page.*)

and electricity for domestic heating, subject to the condition that the prices charged should be appropriately related to costs.

(*b*) The outcome of the competition between gas and electricity and the influence exercised by the systems of tariffs upon the progress of the two industries should be kept under constant examination.

Early in the Report there is a demand for the expansion of research and educational facilities. Nothing stands out in the implications more than the necessity of a free and flexible foundry industry to meet the suggested needs, and the present and planned set up is entirely adequate.

RECENT BRITISH STEELFOUNDRY DEVELOPMENTS

[A mission, which included Mr. H. P. R. Scott (Director of Steel Castings, Ministry of Supply, and director of Thos. Summerson & Sons, Limited, Darlington); Mr. G. Blair, (George Blair & Company, Limited, Newcastle-upon-Tyne); Mr. E. Brewin (British Iron and Steel Federation); Mr. R. Hunter (Clyde Alloy Steel Company, Limited, Motherwell); Mr. W. T. Laverton (Robert Hyde & Company, Limited, Stoke-on-Trent); Mr. F. A. Martin (Samuel Osborn & Company, Limited, Sheffield); and Mr. A. Whiteley (Glanmor Foundry Company, Limited, Llanelly) has recently visited Belgium and France. In Paris and Brussels, Mr. Brewin, speaking in French, presented the following notes on the more recent developments, which have taken place in the British steelfoundry industry. Additionally, films were presented showing bomb and tank-track link production.]

Due to the misfortunes of war, our two industries have been for a time somewhat out of touch, and it is therefore felt that a very brief review of the developments in the steelfoundry industry in Great Britain during the war period may be of interest to you. To give some idea of the expansion of our industry during the war years, it can be stated that in 1938 the potential production was 150,000 tons, as compared with an actual output in 1943 of 360,000 tons. To achieve this is has been necessary not only to change over to a very considerable extent from the fulfilment of peacetime requirements in the form of domestic castings to articles of war, such as bombs, track links, tank turrets and other essential items, but also to convert certain foundries from the production of iron to steel castings. To meet many of the war demands, the steel castings industry was able without serious difficulty to extend its output very considerably. The three special demands, bombs, armour castings and track links, which were more or less "new" in character, presented in the early stages very serious problems, not the least of which was labour supply. The individual steelfounders had their ingenuity and resources very severely taxed in an endeavour to adapt the influx of female labour to the best possible war service in an industry which, to women especially, was unattractive. In this connection, time and energy studies were used to great advantage; and in the creation of the Government-owned steelfoundries, mechanisation was the first concern in order to conserve every ounce of energy on the part of the workers.

Organisation of the Industry

The Herculean task of meeting the ever-increasing demand made on the Iron and Steel Control for steel castings could only be achieved by the utmost co-operation between producers, and it may be of interest to our cross-Channel colleagues to obtain an insight into the make-up of the British Steel Founders' Association, which for all practical purposes was used as the co-ordinating body to work with the various Government departments. This British Steel Founders' Association comprises practically all the steelfounders of Great Britain. No less a figure than 98 per cent. of the total tonnage of steel castings produced by private or publicly-owned foundries comes from members of the Association. To facilitate the workings of the Association, the country is divided into five regions, and the members in each region meet periodically to discuss affairs of interest to the industry. The affairs of the Association as a whole are guided by an Executive Council, which consists of a chairman elected by the members at the annual general meeting, and 11 members chosen by the five regions, each region being entitled to elect so many members to the Executive Council. To guard against any region being out of touch because of the absence of its representative, substitute or deputy members are also elected by the regions. The Executive Council meets frequently, and its transactions are reported to the regional meetings by the regional representatives. In this way every member of the Association has an opportunity to learn how the affairs of the Association are being conducted, and to make known his suggestions, criticisms or agreements.

Standing Committees

Three standing committees are also elected by the regions, and meet regularly for discussions on specialised topics. The first is a technical committee, consisting of leading technical men in the industry. Its function is to initiate and correlate research carried out generally by the steelfounders, to advise on methods of training, on specifications, plant and materials, and in every possible way to promote the technical excellence of steel castings produced by the members.

The second of these standing committees is known as the development committee, and may be described as representing the commercial brains of the Association. Its main function is to study means by which the steel castings industry may be developed, both within itself and in its relation with customers and the general public. One of its aims is to promote closer co-operation between designers and steel-castings producers, another to increase understanding of steel castings by those who use them or might use them if they knew more about their qualities and characteristics. Further, this development committee encourages and makes easy interchange of information among members regarding their individual costs and costing methods; and it also purposes to establish a fund of statistical information. Other objects include development of publicity for steel castings through Press advertisements, film shows, lectures and exhibitions. The third standing committee, known as the price committee, deals with all matters concerning the fixation of economic prices in accordance with the price control requirements of the Government.

British Steelfoundry Developments

All standing committees report back to the Executive Council and present their reports annually to the general meeting of members. All members of committees are elected annually, and give their time entirely at the charge of their individual companies. Briefly, this covers the general organisation of the British Steel Founders' Association; but there is also included within its ambit a large number of sectional Associations whose interests are confined to a particular type of casting, such as, for instance, valve castings or locomotive castings. The membership of these sectional Associations is confined to manufacturers who are mainly interested in producing castings of the particular type catered for by the Association in question. In this way, workable-sized groups are formed, suitable for consultation on matters of common interest. It should be mentioned that the British Steel Founders' Association has grown out of several other Associations, and in its brief existence has done much to stimulate activities for the ultimate good of the industry.

Bomb Production

It is not proposed to raise the well-known controversy of the relative merits of cast-steel bombs as against forged or fabricated bombs, but it is germane to state that some of the members of this mission have seen, in the cities and the industries of Germany, proof of the effectiveness of the cast-steel bomb; but in general it is true to say that each type had its own specialised particular uses. Quite early on the industry foresaw the obvious need for a large increase in capacity for producing cast-steel bombs, and several special bomb foundries were designed and built directly under the auspices of the British Government.

[At this point there was exhibited part of a film taken at the Stanton bomb plant.]

An interesting point is that at the time this Stanton plant was initiated, Great Britain was short of hematite, and the melting unit was laid out specially to produce bombs to the standard specification from 100 per cent. steel scrap. In addition to these Government plants being erected, it was required that existing foundries should increase their rate of production, and many which had never previously made bombs were brought into this type of manufacture. Those which already had experience, placed at the disposal of others the fullest possible technical information; as an example, double contraction patterns for making the necessary metal patterns were freely lent by one producer to another, and all control methods of sand mixes, gating and heading details were freely interchanged.

This was all done without recourse to any organisation of the steelfounders themselves. Contacts were arranged by the Iron and Steel Control, and were personal in nature. By this means a larger output of bombs was obtained, although at the expense of other castings during the difficult time when the Government factories were still under construction.

Early in 1942, it was evident to the British Air Staff that the fragmentation type of bomb used up to that time was not satisfactory for attacking buildings; and as a great deal of Bomber Command's effort was to be devoted to destroying buildings by blast, the steelfounders were approached with the request that they should now produce bombs that had a high penetrative power regardless of fragmentation.

Pearlitic Manganese Steel Bombs

At this time, we in Great Britain were conscious that we had begun to get on top in the contest with the Luftwaffe. The heavy bombings of our country in 1940 and early 1941 were as yet unavenged, but it was known that the time was near when they would be avenged, and the great desire was to make our hitting power as great as possible. In March, 1942, the bomb makers were taken into the Government's confidence as to the future policy, and the suggestion made that all bombs should be cast henceforth in a pearlitic manganese steel which was known to possess a greater toughness. Research was necessary to determine the best analysis and heat-treatment, with particular regard to the varying types of plant and equipment existing, and it was decided to form a Bomb Makers' Committee, consisting of all makers of cast-steel bombs. Experiments with the new steel began immediately, and within three months the bulk of the bombs manufactured were being made of pearlitic manganese steel of the following composition:—C, 0.22 to 0.28; Si, 0.3 to 0.4; Mn, 1.3 to 1.6; S and P, below 0.06 if possible.

Meanwhile, tests were going forward on the penetrative power of this bomb. Ultimately, it was decided that the test should consist of laying the test bomb on a firm anvil and dropping on it a 1-ton tup a sufficient number of times from a predetermined height. The criterion by which the suitability of the bomb was to be judged was the total energy absorbed before the first crack appeared.

Having established a bomb-testing apparatus at one of the maker's works, the Bomb Makers' Committee, in conjunction with other makers, carried out a long series of trials which finally established the most suitable analysis, the austenitic grain size of the steel, and the heat-treatment giving the best results. As each important stage was reached, regional meetings were held at which due recommendations of the Bomb Makers' Committee were put forward and discussed. From these meetings members went back to their foundries and put the recommendations into practice. The Committee issued a full report and recommendations for tests which were then used by the Ministry as a basis of acceptance. Founders who had difficulty in meeting the specifications were assisted by visits of technical personnel from other makers, and sample bombs were taken from all producers from time to time in order to satisfy all concerned that the standard was being maintained. Of interest is the fact that the Bomb Makers' Committee were invited to act as an Advisory Panel to the Ministry, which in itself was a tribute to their work.

Reduced Wall Thickness

As the war progressed, demands were received for bombs capable of carrying a larger proportion of explosive charge. This required that the wall thickness

of the bomb casting be reduced, but the penetrating power had to be maintained at the previously established high level. As an example of the requirements, it may be noted that the 1,000-lb. bomb, which was 50 in. long (excluding nose piece and tail attachment) and 17½ in. in diameter, was required to have a wall thickness no greater than 0.55 in. With the introduction of this type of bomb, all makers immediately established a new standard for absorption of energy before cracking took place. Along with this arose the problem of the greater difficulty of collapsing a core in so thin-walled a casting as that indicated above. Here again the spirit of co-operation and helpfulness among foundrymen led to a rapid solution of difficulties, which were considerable; and at the same time the specification of the steel also was revised and made more stringent than ever before. This new steel specification required a minimum tensile strength of 35 tons per sq. in., and minimum elongation of 20, with a minimum combined figure of 57. This resulted in a considerable improvement in results under the drop test, so that the standard was eventually raised to require an absorption of 40 ft.-tons by the 500-lb. bomb and 60 ft.-tons by the 1,000-lb. bomb before failure by cracking.

Rivalry Stimulated

The maintenance of bomb production at its peak level stimulated the existing rivalry between the British steelfounders. For example, the bombs from one Government factory were found on test to have achieved 300 per cent. of the standard figure of energy absorption before cracking. Thereupon, tests on bombs supplied by a private manufacturer showed figures even in excess of these; so the race for quantity and quality went on. A photograph is available showing bombs after being subject to tests, side by side with an untested bomb for comparison. Tests of actual bomb-dropping were carried out on a target built to simulate a modern factory with concrete roofs and flooring; and these tests fully confirmed that the stringent but self-imposed advance in bomb technique and production more than justified itself.

In this brief survey of British bomb production, all that has been said up to now refers to work done on the comparatively small bombs, *i.e.*, 500 and 1,000 lbs. It will be readily appreciated that the work done by the steelfounders in producing the 10,000-lb. bomb known as "tall boy," and the 20,000-lb. bomb known as "grand slam," required no less a degree of co-operation among the steelfounders, and strict attention to detailed controlling. The results given by these bombs in actual practice were very evident; they are well known to you yourselves, and require no publicity from us on this occasion. These specially developed bombs, unapproached by anything produced by Germany, were manufactured by steelfounders of Great Britain in foundries which normally made ordinary civilian requirements; and there is no doubt whatever that the technique developed, both for these very large bomb castings and for the 1,000 and 500-lb. castings, has become an important part of the fund of knowledge and experience possessed by the steelfounders of Great Britain, and now to be devoted to producing castings for the world at peace.

Cast Armour

Apart from bombs, one of the first needs which called for immediate attention was cast armour. This was a specialised requirement, and represented a comparatively small part of the total demand for steel castings. Before the war very little cast armour had been made in Great Britain. In February, 1940, total production from all sources amounted to only 70 tons per week, whilst the demand for armoured fighting vehicles was calculated to be 350 tons per week by September, 1940, and 800 tons per week by the end of the second year of the war.

Early 1940 found the industry with no knowledge of the real physical requirements to yield satisfactory ballistic properties, and the limited background of experience in the production of cast armour was the decisive factor in the policy in the early part of the war, which was to rely on rolled armour for tanks. However, by 1942 the fighting qualities of cast armour were progressively appreciated, and the percentage of cast armour in the total steel castings production rose from 13.6 per cent. in 1940, to 27.3 per cent. in 1943. The extent of the increased efficiency of production can be judged from the output per head of labour employed, which from 10.88 tons in 1940 rose to 11.96 tons in 1943.

The expansion of the industry for the production of armour castings was achieved by laying down one complete new Government plant, and expanding existing factories. For this purpose 11 privately-owned foundries prepared expansion schemes, so that by the end of 1942 the resultant additional capacity was:—Castings up to 50-lbs. each, 3,640 tons per annum; castings 50-lbs. to 1,000-lbs. each, 10,000 tons per annum; castings over 1,000-lbs. each, 13,000 tons per annum.

Since speed was an essential, the first production was confined to steel of the nickel-chrome-molybdenum type such as had been found satisfactory in rolled plates, and which had already been produced in some quantity for cast armour. A technical committee comprising representatives of all the cast armour manufacturers was established to study production methods and heat-treatment in relation to ballistics. One of the problems at that time was concerned with castings from 10 mm. to 60 mm. thick, and it is interesting to note that by end of the war cast plates 150 mm. thick were being produced.

New Steels Developed

At a later stage in the war the necessity for economy in alloy materials became important, and several new steels were developed. These, of course, were only accepted when results proved that they possessed ballistic qualities as good as, if not better than, those of their predecessors. Later, much attention had to be given to weldable steels, which the industry had to produce without loss of ballistic quality and without increase in alloy content. Very largely this was accomplished by introducing water-quenched steels of low carbon content.

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British Steelfoundry Developments

These developments could not have been made possible without a parallel advance in ballistic testing methods. It would have been very expensive to carry out all ballistic testing on full scale production castings. And one of the important achievements of the technical committee was the development of the target plate casting, which was produced under exactly the same production conditions attending manufacture of tank turrets and similar large armour castings. As the gun shortage was gradually overcome, conditions for the use of guns for ballistic testing became easier, and the work of the technical committee was facilitated. Eventually, acceptance of armour castings came to be made not upon mechanical tests of chemical analysis but upon ballistic trials. Standard curves were established showing the foot seconds of attack by the various types of projectile which had to be withstood by the various thicknesses of armour. These standards were set very close to the high standards required for rolled armour; and it is regarded as no mean achievement by the British steelfounders that many of them, starting with no knowledge whatsoever of casting alloy steel, were able, within a very short time, to attain such high standards as to make it an economical proposition to use cast turrets and nose-pieces on tanks, instead of having to build these up with rolled plate. It is, of course, true that many British tanks were built entirely of rolled plate, but this is in part attributable to the fact that the steelfoundries at that time could not possibly cope with the whole demand.

It may be interesting to note that first deliveries of armour castings were made in 1940 against British contracts on the United States, these being for Matilda turrets. The United States founders, better equipped than their United Kingdom counterparts, reacted swiftly to our proposals, and American designers were also quick to prefer the battle qualities of a casting rather than a number of riveted or welded plates. As a result, the United States Ordnance began to give increasing preference to designs embodying castings, and the United States founders responded by producing cast armour which was ballistically as good as, if not better than, their own rolled armour. In Great Britain, however, it was reckoned that cast armour gave 5 per cent. less protection than the rolled armour produced in the United Kingdom.

Differences were, of course, to be expected between United States and United Kingdom experience, due to the resources of the United States foundries and also to their better ores, which enabled them to produce armour-quality castings by basic open-hearth practice.

Tank Track Links

With the increasing tank production, at the beginning of 1941 a specially acute problem had arisen in the case of tank track links. Numerous difficulties were encountered, of which we should like to mention two: the unsatisfactory performance of malleable cast-iron track links for use on medium and heavy tanks, calling, therefore, for a large-scale transfer to manganese steel; and the shortage of capacity, especially of toughening capacity for castings.

Track links in manganese steel proved in practice to be a highly specialised job. Apart from ordinary foundry considerations of soundness and metallurgical strength, the dimensional accuracy had to be maintained within plus or minus 10/1,000 in. In the austenitic manganese steel used, machining was practically impossible, and the maintenance of the dimensional tolerance on the pin or spindle holes proved a difficult problem. This we overcame by extremely accurate patterns and core boxes, accurate machine moulding and rigorous inspection. It was found that the best results were obtained from a composition of steel within the following limits:—C, 1 to 1.3; Si, 0.5 to 0.8; Mn, 11 to 13; S, 0.06 max., and P, 0.10 per cent. max.

As will be appreciated, after heat-treatment the metal is extremely tough, and in the toughened condition is for all practical purposes non-magnetic. During the first part of 1941 the shortage of manganese tracks was very acute. This was principally due to inadequate heat-treating capacity, the high scale of replacements and spares, and bomb-damage and breakdowns in plants. However, by this time there were in course of erection seven specialised Government plants for the manufacture of track links, and 19 expansion schemes at existing foundries. By the end of 1941 the supply position became much easier, due principally to the design of the track link having been more or less stabilised, and also to the influence of new capacity and a certain amount of help from United States and Canadian production.

Labour Shortage

By 1942 all foundries planned were in production, and the chief bottleneck in meeting demands was labour; this in spite of the fact that the mechanised schemes for increasing production were primarily designed to utilise female and unskilled labour. In the factory where the film now to be shown was made, out of the labour force of 300 employed (mostly local labour), less than 2 per cent. had had any previous experience of foundry work. More than 50 per cent. were women and girls, many of whom had never previously done manual work of any kind.

[A Track Link Film was then shown.]

For the purpose of obtaining the maximum possible output from existing as well as new capacity, basic electric furnaces and the alternate cupola converter method were adopted. The film exhibited used the cupola-converter process, which we believe is original inasmuch as this was the first attempt to mass-produce a casting in a metal never previously used in quantity for such production. This plant, like many of its successors, fully justified expectations, and substantially exceeded the estimated output for which the plant was installed. Needless to say, this plant operated on green sand moulding, with close scientific control. In this connection, it should be stressed that the urgent necessity for conserving shipping space had prompted

C.F.A. SLIDE FILM STRIPS

The film strip which has been made of "The Future for Boys in the Foundry," by the Council of Ironfoundry Associations, has been well received, and one firm has written to say that "this venture has proved to be one of our outstanding successes." In order that the strip may receive as wide a circulation as possible, copies have been made for sale, and these are available for distribution on application to the Council at Derbyshire House, Belgrove Street, London, W.C.1, at a cost of 3s. each. This price should make it possible for any foundry training centre to keep a copy in its library and loan it where desired. Still greater publicity for apprenticeship schemes should then result generally.

Difficulties have been experienced in the obtaining of suitable lanterns for exhibition, and foundry firms are advised that these can be supplied through any local photographic dealer, who may obtain them direct from:—Newton & Company, 72, Wigmore Street, London, W.1; or Visual Information Service, Portable Lanterns, 168A, Battersea Bridge Road, London, S.W.11.

Delivery is good at present. Overseas foundries should find these strips exceedingly interesting. It is hoped, in the near future, to arrange to supply film strips of the manufacture of foundry products showing the sequence of operations in order that would-be entrants to the industry can become acquainted with the methods used in foundry practice.

RECENT BRITISH STEELFOUNDRY DEVELOPMENTS

(*Continued from previous page.*)

our colleagues to concentrate on the development of a substitute for bentonite. The magnitude of this task can be appreciated when it is remembered that green sand practice had been developed around the use of bentonite. In the factory shown in the film, the properties of the sand were kept within the following range:—Green strength, 9 to 11; permeability, 130 to 150; moisture per cent., 3.9 to 4.3 lbs. per sq. in.

In the manufacture of track links, as also in all other spheres of steelfoundry production, difficulties, many of them inseparable from war conditions, were successfully overcome by the wholehearted co-operation of the steelfoundry industry with the responsible Government departments. It has only been possible in a Paper of this kind to touch lightly on the fringe of the products representative of the total annual production of 360,000 tons of steel castings.

The fact that the authors have limited this talk to so-called "new" productions in no way detracts from the strenuous efforts by all concerned to step-up production of equally essential supplies, such as guns, ship and marine castings, heavy engineering castings, aircraft castings, rolls, locomotive and road transport castings, crushers and excavators, agricultural castings, etc. However, perhaps sufficient has been said to indicate that your counterparts in the United Kingdom were not, to say the least, inactive during those long, tedious war years.

BOOK REVIEW

Labour Protection and Accident Prevention in the U.S.S.R., by N. Alexandrov. Published by "Soviet News," 630, Grand Buildings, Trafalgar Square, London, W.C.2. Price 1s.

This booklet, which is quite nicely illustrated, details, by means of a number of interviews, the general organisation of accident prevention in the U.S.S.R. Generally speaking, it is conducted on much the same lines as in this country, except that perhaps there is more elasticity in application. This seems to be productive of more local enthusiasm—a phase taken care of in this country by the activities of national voluntary bodies. The Soviet trade unions without doubt seem a great deal more active in this particular field than has been the case in Great Britain. It is extremely important for readers to realise that the word engineer must not be understood to mean a mechanic—this word on the whole of the Continent of Europe implies the college-trained professional engineer. The reviewer noted, in an article written by a Russian for the quarterly publication of the National Union of Foundry Workers, a statement to the effect that the "engineers" were admitted to membership of the Union. This means, of course, the foundry executives, and not the fitters and turners. The booklet concludes with a note on the Safety First Museum in Moscow. Here, again, the British activities at Horseferry Road are paralleled. The main difference is that there is not the same national inspection by officers of the Ministry of Labour and National Service—but severe penalties are exacted from those breaking the law through local committee work. Those interested in foreign conceptions of industrial action prevention will find much of interest—though personally we would have liked to have seen some data in tabular form rather than just percentage reductions.

V. C. F.

LIGHT ALLOY DATA SHEETS

Alar, Limited, 35, New Broad Street, London, E.C.2, have sent us two data sheets. No. 112A covers LAC. aluminium-silicon casting alloy, in respect of its chemical composition, mechanical properties, physical properties, casting characteristics, and heat-treatment.

The second is entitled "Guide to the Selection of Secondary Aluminium Casting Alloys." It carries a particularly useful column in Table II, where the relative values of ten popular alloys are detailed, together with an approximation of their properties in respect of casting characteristics, and general and mechanical properties. Light alloy founders would be wise to write to Alar, Limited, for copies of these reports.

THE NORTH LONDON BRANCH of the Institute of Welding held its annual general meeting and film night on April 10, at the Regent Polytechnic, London. Two sound colour films were shown, including a Walt Disney film, entitled "The Prevention and Control of Distortion in Arc Welding."

GERMAN ALUMINIUM ALLOY PISTONS

Dr. R. Potvin, of Laval University, reporting to the British Intelligence Objectives sub-Committee (Report No. BIOS 238) on his visit to Mahle Kom. Ges. of Stuttgart, gives some interesting details of the manufacture of submarine engine pistons as die-castings. The works visited were exclusively engaged upon the production of aluminium alloy pistons.

This firm produced under licence the Bohnalite type piston using carbon steel struts. These struts were originally Invar, but this was changed during the war owing to nickel shortage. There was no evidence that carbon steel struts were not satisfactory.

The main alloy used was the Mahle 124 (same as K.S. 1275), having the following compositions: Si, 13 per cent.; Cu, 1 per cent.; Mg, 1 per cent., balance Al. A 20 per cent. silicon-aluminium alloy (K.S. 280) was used occasionally at the request of the customer. In general, no modification process was applied. A small percentage of Y-alloy was also used. Although harder to machine, the Mahle 124 was preferred to the high 10 per cent. copper-aluminium alloy because of its lower expansion and better wear resistance.

Only ready-made alloy ingots were bought from V.A.W., and Lurgi-Thermie (Commissionary Silumin-gessellschaft, Frankfurt/Main. The old pistons and scrap were remelted and used.

The total output of cast pistons in tons per annum was 2,400 tons (about 300,000 pistons) in 1939. In 1942, at peak production, it was 5,400 tons. At time of visit, the production consisted mainly in small articles for domestic use.

Methods of Manufacturing Pistons

Two methods of manufacture were used—casting and pressing—The former involved casting in a die with a collapsible core consisting of 3 to 7 parts, according to size and shape of piston. For instance, for a piston with a rim on the inside of the skirt, at least five pieces were used to produce the inside form of the piston. These pieces were fitted by way of tenon joints to form a single unit core. The centre-piece was withdrawn first, releasing the outside pieces, which were easily dismantled; finally the pins forming the piston pin holes were pulled off.

On dismantling the core, each piece was plunged into water for a fraction of a second in order to keep the die pieces at the proper temperature (approximately 110 to 200 deg. C.). The castings were poured at one hole on one side adjacent to a single blind riser. The small pistons were cast two at a time with a central runner. The struts, used only in the smaller pistons, were preheated four at a time on an electrically-heated device. The dressing sprayed on the dies was composed of chamotte and a sodium silicate solution, to which was added a trace of ammonium chloride. Chamotte is dead burned fireclay grog with plastic fireclay as a binder.

Melting.—Melting for the smaller pistons was carried out in a 1-ton capacity furnace (4 cwts. per hr.). The metal was transferred to a battery of smaller holding furnaces of about 1 cwt. content. A small quantity of magnesium was added at this stage to compensate for losses and a proprietary flux; a mixture of chlorides and fluorides was sprinkled on top of the melt and stirred in to take away oxides and gases (no modification). The surface was skimmed and ladling was started at a temperature of about 700 deg. C.; when the metal temperature became too high (as checked with immersion thermocouples) cold scrap pistons were thrown into the bath. One furnace supplied the metal to two moulders, whose production averaged each about 45 small pistons per hr.

Trimming.—The pistons were trimmed on a silicon carbide high speed cutting wheel. This method was considered faster, more economical, and much better than the usual saw trimming.

Heat-Treatment.—The cast pistons were given a single heat-treatment at 200 deg. C., which obviated the risk of cracking found when a double heat-treatment (water quenching and ageing) is used. This treatment was conducted in three home-made vertical air circulating furnaces 5½ ft. high, 4 ft. large, and 4 ft. deep. The cycle for heat-treating the Mahle 124 was:—(*a*) Pistons enter the furnace at 195 deg. C.; (*b*) the temperature is increased to 200 deg. C. in 1 hr.; (*c*) heating at 200 deg. C. is prolonged for five more hours, and (*d*) the pistons are cooled down in air.

Casting of Large Pistons

The large 16-in. dia. piston for submarines (2 ft. high and weighing about 2 cwts.) was also made as a die casting of design similar to the smaller die casting, with a collapsible core, composed of seven pieces, and one runner, but with two risers. The mould, composed of two die blocks opening on hinges by hydraulic means, was preheated with gas burners to a temperature of about 250 deg. C. before casting. One piston was cast about every 40 min. The Mahle 124 was preferred to Y-alloy for these pistons, which were sent to Gevelsberg Rhineland, for large Junker submarine engines.

Remelting.—The firm scrap was recovered by melting and treatment with PCl_5 (introduced into the metal bath by means of an inverted plunger) for large pistons; and chlorine gas for small ones.

Anodising.—Just the crown of some pistons was anodised (Eloxal treatment), otherwise it was found that wear on the piston, especially at the ring grooves, was high.

Ring Carrier.—In some tractor pistons (Anomac tractor) a steel insert was cast in for the top compression ring. The material of the insert was grey cast iron, which was used as a substitute for a 15 per cent. Ni, 10 per cent. Cu steel previously employed.

Testing.—The metal composition was controlled by spectrographic analysis before melting. Routine inspection consisted of hardness tests and gauging. Experimental work had been carried out in a fatigue laboratory equipped with one 20-ton pulsating machine (Zug Druck Pulser), one rotating, and one vibrating machine for flat specimens. These were all high-temperature fatigue testing machines.

(*Continued on page* 417.)

INDIAN FOUNDRY PRACTICE

When Mr. Blakiston read his Paper on this subject before the London branch of the Institute of British Foundrymen he gave much additional information in the discussion, an abstract of which is printed below.

DISCUSSION

MR. BLAKISTON, replying to a question concerning the daily hours of work in Indian foundries, said that in the cities and large towns the working hours were much the same as in England. The employees worked a 48-hour week. There might be a small variation of two or three per week more or less. As to the staff, usually the works executives arrived at the works at between eight and nine o'clock, depending on their individual positions, and they normally left at 5 o'clock. In the country foundries the employees began work at 7 o'clock in the morning, they had a break of two hours for lunch and left at 5 o'clock in the afternoon.

Extent of European Participation

MR. E. H. BROWNE asked what was the approximate proportion of European to native labour in the Indian foundries.

MR. BLAKISTON replied that, excluding the military, the ratio of Europeans to Indians in the population was about 1 per 100,000. He believed the European population at Calcutta, a city of some 2,000,000 people, was about 7,000. At one general engineering works he mentioned, employing 7,000 people, there would be probably 20 Europeans. Thus the proportion was not high. The Europeans were required to be of high executive ability, and they worked in conjunction with Indian managers, who were good. The Europeans had to be specialists in their particular line, for the industrial concerns could not afford to pay the cost of taking people out there and paying them high salaries, to do routine work or stereotype operations.

Apprenticeship and Coremaking

MR. R. OLDERSHAW asked at what age Indian youths entered the foundries and what training they received. Secondly, in view of the outputs sometimes attained, recalling a slide Mr. Blakiston had exhibited showing a team of five operators making approximately 200 large moulds per day, what was the average age of the people employed on this work and what was the period of their useful lives in industry? Thirdly, although photographs had been shown of the pattern shops, foundries, and fettling shops, no reference had been made to coremaking. He asked whether the coremaking shop was run as a separate department in Indian foundries.

MR. BLAKISTON replied that there was no apprentice system amongst the operatives and craftsmen as it was known in this country, and recalled that Indian life was based on the family system. Families and sects usually concentrated on a particular trade; for example, an Indian might be a joiner by trade. In time his small son would be introduced into the works doing odd jobs to help his father. Eventually, as he became useful, he would be introduced on to the pay roll and in course of time his experience would extend as the necessity arose for him to earn more money. In that way craftsmanship developed on a family basis. In some ways it was quite a good system, the employment of a man to do a particular job whether he be a pattern-maker or any other craftsman, depended on his ability to do that job only, and if he was a good metal worker as well, there was no restriction on him following his other bent if he so desired.

Training Systems

For the better educated Indian trainees, there were full apprenticeship and training systems which compared with the senior apprenticeship systems in this country, and the trainees were known as "A" class apprentices. They received intensive training and instruction in all the shops. At the conclusion of their apprenticeship many continued their education; many Indians, particularly the Bengali, attached considerable importance to the continuation of their education and never really finished this quest, and if circumstances permitted, would attend the educational institutions until middle life.

The average expectation of life of the Indian at birth was only 27 years; there were certainly some Indians who lived to a great age, but the death rate during childhood and in early life was very high, mainly on account of malnutrition and malaria. In many cases, the uneducated Indian would not take elementary precautions against some of the prevalent diseases.

Coolie Labour

The coolies engaged in the foundries are generally quite a good type and they work hard up to the age of 30 years or so, which was longer than the expectation of life of the average Indian. As is common in the ironfoundries in England, so in India there were more older men in the foundries than in many other industries.

With regard to core manufacture, specialised cores for ingot moulds and pipe work were made in allocating special sections of the foundry, but normally core production was scattered round the foundry promiscuously.

A tremendous amount of green sand work was done and the moulder made his own cores. As in this country there was considerable scope for improvement in core manufacture by the segregation of this operation to a separate department.

Methods of Payment

Replying to a question concerning the system of payment of foundry workers in India, MR. BLAKISTON said that generally the production work was paid for on a piecework basis, but as in this country, time rates were in operation for craftsmen's work.

Much repetition work was done in India and the bulk of it was paid for by the contract system. Nearly all the labouring operations, such as handling materials, removal of ballast, were paid by this system. In some cases a whole foundry would be run by a contractor, the firm merely furnishing the plant and raw materials —the contractor provided all labour.

Indian Foundry Practice

A contracting system lent itself to many abuses, but the trend was to supersede this method as far as possible by direct employment, which entailed responsibility by the companies for certain social services to the employees.

Pattern Shop Plant

A MEMBER commented that he had not seen any machinery in any of the pattern shop photographs shown and asked whether the Indian pattern-maker did all his work by hand. MR. BLAKISTON explained that the photographs were taken from the machinery side of the pattern shop in question and said that it compared with the average pattern shop in this country. The pattern shops in question were being brought up to date by the installation of individual drive machines coupled with modern pattern shop and storage organisation. The craftsmanship was of a high type and compared favourably with that in the U.K. Generally, the Indians worked with harder woods, such as teak.

Another member commented that the photographs showed that the majority of the work was of a heavy type and asked whether fine work was undertaken, such as cylinder blocks which required intricate cores and demanded a high degree of skill.

Repetition Work

The AUTHOR replied that, so far, intricate cored work had not developed to any great extent in the East. It was hoped, however, that in the course of the next few years it would be possible to do such work on a fairly large scale and he believed it would start *via* the electrical industry—the internal combustion castings would come later on. The majority of the production work was done in green sand; light castings, rain water goods, cisterns, etc., were made in large quantities, one foundry alone producing 500 tons of these castings per week. Locomotive cylinders and individual oil engine cylinders were produced, but to his knowledge there was no mass production of moulded cylinder blocks at present.

In reply to a question as to what materials were used for patterns, the AUTHOR stated that metal patterns were invariably used for repetition work and were of a high standard, wood patterns were made in teak, and on account of the war and the destruction of the teak forests by the Japanese, substitute woods were now being used.

Non-ferrous Activities

MR. MOCHRIE asked whether the developments in connection with the mass production of non-ferrous articles in India were comparable with the developments in this country during recent years. As to the types of alloys used, he asked whether the mixtures employed for the base alloys were in line with the Indian State railway specifications. It appeared to him that those specifications were rather old and he wondered whether India was developing its non-ferrous alloys in a similar manner to Great Britain.

MR. BLAKISTON replied that the Indian State Railway specifications were particularly rigid and he did not think that they were identical with those of this country. All the principal Indian railways were now State railways with common specifications. The standard white metal used for rolling stock contained 5 per cent. tin, 13 per cent. antimony, 0.5 per cent. copper, the balance being lead. The housing was a straight bronze, containing 10 per cent. tin, 10 per cent. lead, and 80 per cent. copper. Apart from the railway castings which were made to specification in proper brass foundries, there were few mass production brass foundries in India. The bulk of the non-ferrous castings were made in the bazaars by home industries in small houses. The Indians would make moulds and melt the metal in a pot over the fire and produce small castings in a competitive manner which was in some cases very disconcerting to the larger foundries who had to pay a living wage.

Non-ferrous developments were taking place in India, and die casting was starting to creep in, though many of the more recent developments and innovations had taken place in the ordnance factories and were not generally outside this sphere, but India was a large country and the developments should offer considerable scope for modern non-ferrous production methods, particularly die casting.

Future for European Technicians

The branch president (MR. A. J. MURPHY, M.Sc.) asked what effect the present growth of the self-determination movement would have on the opportunities afforded in India for the young Western technician. It seemed self-evident, he said, that the Indians would make the most strenuous efforts to look after their affairs themselves, and naturally they would also desire to exclude the non-Indian technician.

Asking what the Indians wanted to do with the money they could earn, he said he believed the moneylender played a very important part in the economic life of the Indian working population. Did the Indian operative spend his money on acquiring goods for himself, or would he save it in order to be able to take a long holiday?

MR. BLAKISTON replied that a technician travelling abroad should be above politics. If he had the ability no account should be taken of his race, creed or nationality. A large number of works in India were Indian owned or were in the process of becoming Indian owned and no new project or venture could be put down in India without the Indians having opportunity to acquire the controlling interest. The Tata organisation was a 100 per cent. Indian concern, the original capital could not be raised in the U.K., and the millions necessary for the flotation of this large undertaking were subscribed in small amounts in India. At first the company had secured specialists from America, Britain, Germany and other countries, but it was found that some of these men were not so good as had been anticipated. After a few years they had tried to make the organisation 100 per cent. Indian operated, but again this was not entirely successful and they had apparently revised this policy and, where

necessary, introduced the man capable of doing the job irrespective of nationality. Thus, although the European would not have the monopoly of the technical work, in India, a first-class European possessing ability would have his chance purely on the basis of that ability.

The moneylending business thrived largely as the result of the old social systems and customs which have been in vogue for thousands of years, and would not be broken down easily on account of tradition. In some cases, girls had to be provided with dowries, but apart from this aspect the moneylenders in India as elsewhere thrived on poverty. As social progress developed, these individuals would gradually be eliminated, but in a country of such a colossal size and population as India, it was bound to be slow.

Vote of Thanks

MR. R. B. TEMPLETON (past branch president) proposed a hearty vote of thanks to Mr. Blakiston for his Paper. Having spent 12 years in India himself, he complimented Mr. Blakiston on having made so complete a study of conditions there and of the psychology of the Indians in so short a time. Urging that Englishmen who were going to India should go there in the right spirit, he said it was a great country and it offered great opportunities: the young technician should not worry about anything that might be said about the conditions by people who were there 30 years ago. Not all foundries in India were primitive; he had seen foundries there 10 years ago which were fairly efficient and considered that probably they had been maintained to up-to-date standards.

MR. TOM MAKEMSON, M.B.E. (General Secretary of the Institute), seconding, said the Paper by Mr. Blakiston was of a type that was needed from time to time. Most lectures dealt with some branch of foundry practice; the lecturer discussed it rather fully and probably revealed some new aspect. That was how progress was made. But it was important that every now and again there should be an opportunity for a general review of foundry practice in a branch of the industry in which the members of the Institute were perhaps not closely concerned, or in another country. Mr. Blakiston had discussed, not incipient industrialism, but quite advanced industrialisation in the vast and somewhat mysterious country of India. One was amazed by the depth to which he had penetrated the Indian psychology and by the amount of knowledge he had acquired of Indian technology in a comparatively short time.

(The branch president associated himself with the vote of thanks, which was accorded with acclamation.)

MR. S. C. MASSARI, recently awarded the Legion of Merit for his work in the Chicago Ordnance District, has been appointed technical consultant of the American Foundrymen's Association. In the absence of Mr. N. F. Hindle, technical development programme director, he is carrying through the programme for the association's jubilee congress in Cleveland, May 6 to 10.

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

APRIL 24.

Institute of Welding :—"The Evolution of Welded Armoured Fighting Vehicles," by Major R. J. Fowler and Major L. P. Denaro. At the Institution of Civil Engineers, Great George Street, Westminster, S.W.1, at 6 p.m.

Institute of British Foundrymen

APRIL 27.

Newcastle branch :—Annual meeting. At the Neville Hall, Westgate Road, Newcastle-upon-Tyne, at 6 p.m.

West Riding of Yorkshire branch :—Annual general meeting. At the Technical College, Bradford, at 6.30 p.m.

APRIL 30.

London branch :—Annual general meeting. Short Paper competition. At the Charing Cross Hotel, at 7.30 p.m.

THE INCREASING QUANTITIES of Government surplus machine tools becoming available for the re-equipment of British industry has enabled the Ministry of Supply and Aircraft Production to modify the conditions for export. The period of four months during which machines are on offer to British industrialists through the disposal centres is reduced to two months, and purchasers for export may acquire the machines at the same favourable prices as users in the United Kingdom.

GERMAN ALUMINIUM ALLOY PISTONS

(*Concluded from page* 414.)

Magnesium Pistons.—It was mentioned that magnesium alloy pistons containing about 1 per cent. Si had been used for racers; a magnesium alloy containing Cerium 5 per cent., Mn 2 per cent, having better strength and fatigue properties, had been tried with some success on the racers. In general, they showed excessive wear on the ring grooves.

Elektron, G.m.b.H.

The main products of the Elektron G.m.b.H. were magnesium sand castings, especially aircraft wheels ranging up to 32 in. in diameter, hydraulic wheel brakes, and other various auto parts. The whole plant was very badly damaged; over 60 per cent. of the machine shop was destroyed; a small foundry, however, remained intact. At time of visit (August, 1945) no technical personnel were available immediately. The foundry was small and of little importance. Natural sand with 1 per cent. boric acid, 6 per cent. sulphur, and 5 per cent. moisture was used for moulding. The core sand was composed of fine quartz sand with 1 per cent. boric acid, 6 per cent. sulphur, and a proprietory binder.

The foundry was equipped with a central sand handling equipment:—One sand mixer, storage bin, conveyor, one core blower, one large vibrating moulding table, two gas ovens for core drying. The melting of magnesium was carried out in three electric melting pit furnaces about 350 lbs. each. The standard I.G. process with Elrasal and superheating was used. A modern machine for wheel testing (including tyres and brakes) was provided. This target as a whole was considered as of little interest.

WELSH FOUNDRY WORKERS FOR DERBY

An acute shortage of foundry workers in Derby, where local firms have contracts worth several millions of pounds for the export market, has been alleviated by the recruitment of volunteers from the ranks of jobless foundrymen in South Wales. With the town's labour market starved of all types of semi-skilled and unskilled workers, unemployment is virtually nil, and operatives have fought shy of the foundries in favour of other work. As in other centres, lack of labour has been threatening foundry bottlenecks in the town's engineering trades.

Employers were called into conference with Ministry of Labour officials, who agreed to invite volunteers from South Wales if the firms would find accommodation for the men in Derby. Fifty-eight Welsh foundry workers are now living in the town in lodgings, and more are to be transferred to Derby if volunteers are forthcoming from South Wales. The firms to which they have gone are: International Combustion, Limited: Qualcast, Limited, and Aiton & Company, Limited. All three are heavily engaged on orders for overseas markets.

CAST IRON IN CONTEMPORARY BUILDING AND ENGINEERING

Mr. J. G. Pearce, M.Sc., Director of the British Cast Iron Research Association, addressed the Fellows of the Royal Society of Arts on this subject last week. In the absence of Mr. W. R. Blair, M.C., LL.B., Mr. J. Galbraith Sneddon presided. The lecturer first explained the nature of cast iron, and indicated that it was in reality a range of alloys capable of yielding tensile strengths up to 45 tons per sq. in., or being particularly resistant to corrosion or the ill effects of high temperature. Next, he sketched the history of cast iron from the 10th century when the Chinese were sufficiently advanced in the art to make high grade artistic castings, to to-day's United Kingdom production of 2¼ million tons. His next section outlined in some detail the manufacture and uses of cast iron. This section was still further elaborated by special notes on the use of cast iron in contemporary building and architecture, and in engineering practice. His lecture was profusely illustrated with lantern slides.

PUBLICATION RECEIVED

Thermal Properties of Copper, with Particular Reference to Copper Pipes, by G. W. Preston. Published by the Copper Development Association, Grand Buildings, Trafalgar Square, London, W.C.2.

This 16-page pamphlet reviews the fundamental thermal properties of copper, following which a comparison with steel is made. Useful tables and graphs are included. The Paper makes a really useful contribution to the subject matter.

A METER ASSEMBLY WORKS is to be opened at Bury by Metropolitan-Vickers Electrical Company, Limited.

INDUSTRIAL INTELLIGENCE FROM GERMANY

It has been decided to bring over to this country not more than 200 German scientists and technicians to work in a purely advisory capacity for a limited period. The object of this step is to secure for British industry the best industrial intelligence from Germany.

Those chosen, all of them volunteers, will be research workers of exceptional brilliance or specialists in industrial techniques or processes likely to be of great interest and usefulness to British manufacturers. The acid test in selection is the possibility of a real contribution to development in existing industries or of the establishment of new branches, as a result of the research undertaken.

The experts will be employed by the Government, who will loan them to trade associations and research organisations. All inventions or discoveries will be used for the benefit of industry as a whole. In certain circumstances, opportunities of practical research may best be given by attachment to a particular firm, but there is no question of any German worker holding a position of authority or of replacing any British worker.

During their stay here, they will be subject to the normal security safeguards attached to enemy aliens. Before final acceptance, the political background of each will be carefully examined. The Government will grant them salaries sufficient to cover their own board and lodging and the maintenance of their families in Germany. Normal British income tax will be deducted. They will be housed, wherever practicable, in hostels and Nissen huts.

F.B.I. TRADE MISSION TO DENMARK

An industrial mission, headed by Sir Guy Locock, vice-president and formerly director of the Federation of British Industries, has arrived home after discussing in Denmark with the three leading Danish industrial and commercial organisations the nature of Denmark's import requirements and how far Great Britain can meet them. This mission, which had the approval of the United Kingdom and Danish Governments, spent a week in Copenhagen. After discussions on general problems affecting the trade of the two countries, talks were held between the representatives on each side of individual trades. It is understood that progress towards re-establishing normal trade between the two countries was achieved.

The following were among the members of the mission, in addition to Sir Guy Locock:—Mr. C. S. Bache, representing the Hardware Trade Alliance; Mr. W. A. Barclay (Machine Tool Trades Association); Mr. R. Colin Smith (British Iron and Steel Federation); Mr. W. H. Craig (Mining Association of Great Britain); Mr. J. Davidson Pratt (Association of British Chemical Manufacturers); Mr. H. J. Lloyd (agricultural machinery).

THE DENBAR ENGINEERING COMPANY, LIMITED, is being wound up voluntarily. Mr. H. Cavenagh, 41, Water Street, Birmingham, 3, is the liquidator.

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN

The following particulars relating to pig-iron and steel production in Great Britain have been extracted from the Statistical Bulletin for March, 1946, issued by the British Iron and Steel Federation. Table I gives the production of pig-iron and ferro-alloys in February, with the number of furnaces in blast at the beginning of March; Table II, production of steel ingots and castings in February, and Table III deliveries of alloy and non-alloy finished steel. Table IV summarises the activities of the steel industry as a whole during the six months ended February, 1946.

TABLE I.—*Production of Pig-iron and Blast-furnace Ferro-alloys (Thousands of Tons.)*

District.	Furnaces in blast, 2.3.46.	Weekly average production, February, 1946. Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts, Northants and Essex	22	—	15.4	16.8	1.8	—	34.0
Lancs. (excl. N.W. Coast), Denbigh, Flints and Ches.	7	—	5.8	—	—	1.5	7.3
Yorkshire (incl. Sheffield, excl. N.E. Coast							
Lincolnshire	12	—	19.9	—	—	—	19.9
North-East Coast	25	5.6	26.5	0.7	—	1.2	34.0
Scotland	10	0.6	8.4	2.1	—	—	11.1
Staffs, Shrops., Worcs and Warwick	8	—	6.0	1.1	—	—	7.1
S. Wales and Monmouthshire	7	2.6	16.5	—	—	—	19.1
North-West Coast	7	13.5	—	0.1	—	—	13.6
Total	98	22.3	98.5	20.8	1.8	2.7	146.1
January, 1946	100	21.8	97.4	20.1	1.3	2.9	143.5
February, 1945	103	20.7	94.9	18.0	0.7	2 4	136.7

TABLE III.—*Deliveries of Alloy and Non-alloy Finished Steel.* (Thousands of tons.)

Product.	Weekly average. 1944.	1945.	1945. Feb.	1946. Jan.†	1946. Feb.
Heavy rails and sleepers	6.5	7.1	7.0	9.5	9.4
Heavy and medium plates	30.8	26.4	26.3	27.6	30.6
Plates—alloy	1.9	1.1	1.9	0.6	0.4
Other heavy steel products	38.2	33.1	40.3	28.2	31.9
Light rolled products (excl. wire rods and alloy steel bars)	46.2	41.9	48.0	43.1	46.3
Ferro-concrete bars	2.1	1.8	1.0	3.6	2.3
Cold-rolled strip (excl. alloy)	4.2	4.0	4.6	3.8	4.1
Bright steel bars (excl. alloy)	4.9	3.9	4.7	3.8	3.8
Sheets, coated and uncoated (excl. alloy)	21.2	20.2	23.5	21.1	22.5
Tin, terne and blackplate	10.0	9.5	10.1	9.8	10.1
Tubes, pipes and fittings	12.9	11.2	11.9	12.0	13.9
Steel wire (excl. alloy)	12.2	10.2	11.2	11.4	11.9
Alloy bars, sheets, strip and wire	5.6	3.0	3.9	2.5	2.6
Steel tyres, wheels and axles	2.6	2.5	2.4	2.8	2.6
Steel forgings	10.9	7.5	9.7	6.0	6.6
Steel castings	6.8	5.0	6.5	3.3	3.5
Total production*	217.0	188.4	213.0	189.1	202.5
Less Intra-industry conversion	24.5	17.8	21.9	15.8	17.5
Total	192.5	170.6	191.1	173.3	185.0
Add Deliveries of imported finished steel	5.0	1.0	1.7	0.1	—
Total deliveries of finished steel	197.5	171.6	192.8	173.4	185.0

* Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.
† Revised.

TABLE II.—*Production of Steel Ingots and Castings.* (Thousands of tons.)

District.	Weekly average production, February, 1946. Open-hearth. Acid.	Basic.	Bessemer.	Electric.	All other.	Total. Ingots.	Castings.	Total ingots and castings.
Derby., Leics., Notts., Northants and Essex	—	—	(Basic) 10.3	1.0	0.3	11.2	0.4	11.6
Lancashire (excl. N.W. Coast), Denbigh, Flint. and Ches.	1.1	18.1	—	1.3	0.4	20.1	0.8	20.9
Yorkshire (excl. Sheffield and N.E. Coast)								
Lincolnshire	—	24.1	—	—	0.1	24.0	0.2	24.2
North-East Coast	3.0	42.4	—	0.5	0.4	45.2	1.1	46.3
Scotland	4.6	30.5	—	0.4	0.6	34.9	1.2	36.1
Staffs., Shrops., Worcs. and Warwick	—	12.5	—	0.5	0.6	12.5	1.1	13.6
S. Wales and Monmouthshire	5.0	40.6	(Basic) 5.3	0.6	0.1	51.3	0.3	51.6
Sheffield	9.7	19.8	—	5.2	0.6	33.8	1.5	35.3
North-West Coast	0.5	3.2	(Acid) 3.9	—	—	7.6	—	7.6
Total	23.9	191.2	19.5	9.5	3.1	240.6	6.6	247.2
January, 1946	19.2	178.5	18.8	9.0	3.3	222.7	6.1	228.8
February, 1945	22.0	184.6	16.8	12.0	6.0	229.5	11.9	241.4

(Continued at foot of next page.)

PERSONAL

MR. WILLIAM LORIMER, chairman of the North British Locomotive Company, Limited, Glasgow, has resigned from that position on medical advice. SIR FREDERICK C. STEWART has been appointed chairman of the company, and MR. A. S. MACHARG has joined the board.

MR. JOHN HEPBURN has resigned from the directorate of Davidson & Company, Limited, Sirocco Engineering Works, Belfast, to become managing director of Musgrave & Company, Limited, St. Ann's Ironworks, Belfast, in which he has acquired a substantial capital holding.

MR. H. SPEED PEACOCK, who has been general manager of Guest, Keen & Nettlefolds, Limited, Castle Works, Cardiff, for the past 10 years, has retired from that position and has been succeeded by MR. N. R. R. BROOKE, general manager of the company's Cwmbran Works, who will, in future, be responsible for the management of both the Cardiff and Cwmbran works.

THE RT. HON. LORD INVERFORTH, MR. CECIL ENTHOVEN, MR. H. G. JUDD, MR. G. T. HANNAFORD and MR. PHILIP W. SMITH have resigned from the board of H. J. Enthoven & Sons, Limited, metal merchants, etc., of 15, Lime Street, London, E.C.3. MR. A. M. BAER has joined the board and has been appointed chairman, while MR. H. J. ENTHOVEN, MR. R. T. DE POIX and MR. F. V. ANGELL have also become directors.

SIR THOMAS BELL, owing to advancing age, has resigned his seat on the board of John Brown & Company, Limited. SIR ARTHUR MATTHEWS has been elected a director of the company; he is managing director of Thos. Firth & John Brown, Limited, a director of Firth-Vickers Stainless Steels, Limited, Markham & Company, Limited, David Brown & Sons, Limited, chairman of British Acheson, Limited, and chairman of Firth-Derihon Stampings, Limited.

MR. PEARSON HARRISON, one of the best known trade union figures in Darlington, will retire from the Town Council, of which he is an Alderman, at its next meeting, after almost 25 years' service. He was, up to his retirement about 18 years ago, a steelmoulder employed by the Darlington Forge, Limited. Mr. Harrison is one of the oldest members of the National Union of Foundry Workers, of which he is local branch secretary. He will be 80 years of age next month.

MR. A. D. MARKLAND, who is one of the few who have been associated with B.T.-H. turbine plant since the British Thomson-Houston Company, Limited, Rugby, commenced manufacture in 1903, has retired. During his long service he has been associated with contracts for the installation of many large turbo-alternators and, especially during the earlier years, assisted considerably in developing the applications of turbo-generators for power supply to industry, including collieries and steelworks.

MR. H. E. EDWARDS, who has been on the staff first of Steel, Peech & Tozer, and then of the United Steel Companies, Limited, for 54 years, will retire as from June 30 next owing to ill-health. MR. H. A. A. WHILE has been appointed London manager (Railways Department) to succeed Mr. Edwards as from April 1 last. Mr. Edwards joined Steel, Peech & Tozer when they first opened a London office in 1892. He was for some years manager of the office and for many years has been responsible for the sales of all railway materials for the United Steel Companies.

MARCH IRON AND STEEL OUTPUT

Official figures (in tons) of pig-iron and steel production for March, with comparative figures, are given below:—

Month	Pig-iron		Steel ingots and castings	
	Weekly average	Annual rate	Weekly average	Annual rate
March, 1946	147,300	7,660,000	255,700	13,295,000
February, 1946 ..	146,100	7,600,000	247,200	12,854,000
January, 1946 ..	143,600	7,467,000	228,800	11,898,000
March, 1945	141,400	7,354,000	246,100	12,799,000
February, 1945 ..	136,700	7,109,000	241,400	12,553,000
January, 1945 ..	127,100	6,609,000	216,300	11,248,000

UNEMPLOYMENT BENEFIT paid last year amounted to £8,262,000—an increase of £5,373,000 on 1944—according to the report of the Unemployment Insurance Statutory Committee. Receipts of the unemployment fund were £79,434,134, of which all but £7,137,116 represented insurance contributions by employers, employed persons, and the State. Expenditure, including benefits, was £11,933,537. There was a net balance to the fund at the end of last year of £362,513,652.

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN—*Continued from page 419.*

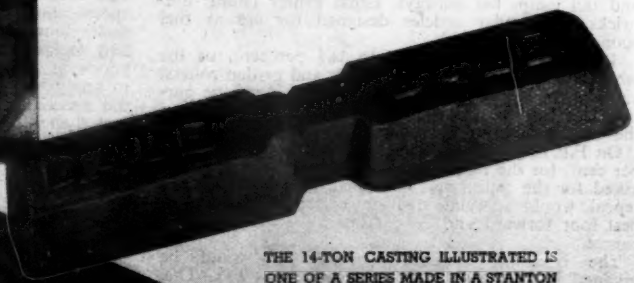
TABLE IV.—*General Summary of Pig-iron and Steel Industry.* (Weekly average in thousands of tons.)

Period.	Iron-ore output.	Imported ore consumed.	Output of pig-iron and ferro-alloys.	Scrap used.	Output of steel ingots and castings.	Deliveries of finished steel.*	Steel stocks* held by producers, etc.
1944	297.6	46.8	129.5	141.7	233.5	197.5	2,171.0
1945	272.5	77.2	136.7	138.5	227.3	171.6	1,683.9
1945—September	246.1	97.8	139.5	145.1	240.6	176.9	1,263.8
October	247.4	106.3	146.1	146.1	243.0	166.5	1,211.5
November	249.0	104.4	150.0	147.3	246.9	179.4	1,212.5
December	231.4	100.4	145.5	131.9†	221.5	164.2	1,189.7
1946—January	245.3	96.7	143.6	134.9†	228.8	173.4	1,223.9†
February	256.1	99.6	146.1	145.9	247.2	185.0	1,195.8

* Stocks at the beginning of the years and months shown. † Revised.

STANTON-DALE
REFINED PIG IRON

Manufactured to guaranteed analyses in seven standard grades. Also obtainable to individual specification



THE 14-TON CASTING ILLUSTRATED IS ONE OF A SERIES MADE IN A STANTON FOUNDRY FROM STANTON DALE IRON

1. Core being lowered into mould
2. Pouring the metal
3. Finished casting in transit

The STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

IN PARLIAMENT

The Budget

Industrial highlights of MR. DALTON'S Budget included the lifting of purchase tax from many domestic appliances, and the abolition at the end of 1946 of E.P.T.

E.P.T. will terminate on December 31, and it is proposed to make special provision for relating back certain expenditure incurred after the termination of the tax.

The following goods are among those to be exempted from purchase tax:—Hollow-ware of iron or steel (whether enamelled or not), aluminium, magnesium, copper or brass; cupboards, dressers, draining boards and similar utensils designed for use in kitchens; electric kettles and other cooking utensils incorporating heating elements; thermal insulation covers designed for domestic water systems; portable lamps, hand lamps designed for operation from electric mains; head, side and tail lamps for railways, signal gantry lamps; firebricks and similar articles designed for use as fuel economisers.

The duty will be reduced to 16⅔ per cent. of the wholesale value on:—Lawn mowers and garden rollers; vacuum flasks and vacuum jars used for domestic purposes. The rate will be reduced to 33⅓ per cent. of the wholesale value on garden furniture.

On E.P.T., MR. DALTON said it would continue at 60 per cent. for the remainder of this year. Industry had asked for the repeal and he hoped, therefore, that the repeal would stimulate private enterprise to put its best foot forward and go flat out for an expansionist course.

The National Defence Contribution would be retained, but it would be renamed the Profits Tax. This was a flat tax of 1s. in the £ on all profits before distribution. With the termination of E.P.T. this should bring in about £50 million a year.

"I have carefully considered," he said, "whether, while repealing E.P.T., I should now either increase N.D.C. or introduce some new tax on profits or excess dividends. I have not yet reached a final decision, nor is it necessary for me to do so this year. I shall continue during the coming year to study this and other possibilities of new taxes, of which a great variety has been suggested."

The situation would be governed by the general budgetary and finance considerations to a large extent —"and to some extent by the conduct of private enterprise in the meantime." Response to his appeal that increased profits should be ploughed back into industry had been "patchy," he declared.

The Government's varying attitude to private industry was the main theme of MR. ANTHONY EDEN'S comments on the Budget. The Chancellor had done his bit towards increasing production by abolishing E.P.T., he said, but the Government must make up its mind about private enterprise. The position at the moment was like that of a bad rider who beat his horse into a muck-sweat and then declared "what a rotten beast you are," when really it was the rider who was arrogant and inept. It was no good Ministers praising private industry in the House on Thursday and then other Ministers attacking the same industry on Sunday —as had happened recently.

Licences for Limited Imports

The Government had had under consideration the import licensing system to see what steps could be taken, within the limits dictated by the United Kingdom's balance of payments position, to facilitate the reopening of established trade connections in certain categories of manufactured goods for which no import licences were being granted, said MR. MARQUAND, Joint Parliamentary Secretary to the Board of Trade, replying to a question by MR. RHODES. So long as balance of payments difficulties continued, the free flow of imports for goods which it was not essential to import clearly could not be contemplated. It would, moreover, be inequitable to resume imports in cases where United Kingdom manufacture was at present prohibited or so heavily restricted as to render inappropriate even very limited imports. Where United Kingdom manufacturers had been forced to conform to special standards or specifications it might be necessary to impose similar restrictions. Within those limitations the Government had decided to admit small amounts of manufactured goods at present completely excluded, this relaxation to apply to imports from countries willing to operate the necessary administrative arrangements and whose underlying financial arrangements with the United Kingdom made it possible. Goods so imported would be subject to the price controls on similar goods produced here.

Accordingly, where an oversea manufacturer of a particular class of goods had an established market in the United Kingdom before the war, applications for import licences on the basis of approximately 20 per cent. of the value of his pre-war trade would be favourably considered. Arrangements would be worked out with the Governments of the countries concerned, and as they were made, detailed notices to importers setting out the procedure and any additional goods covered would be published. Applications should not be submitted in advance of these notices. The necessary arrangements had already been worked out in the case of Canada.

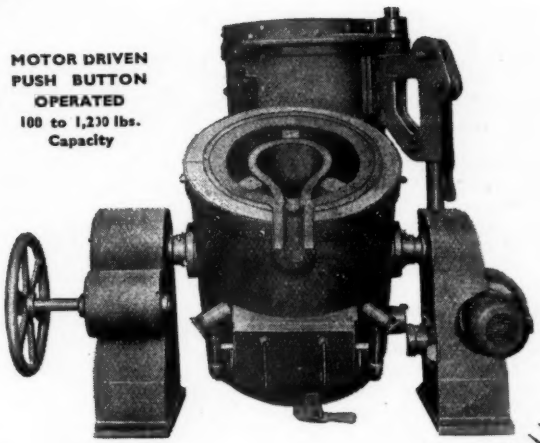
NEW CRANSLEY BLAST FURNACE BLOWN IN

A blast furnace at the Kettering works of the New Cransley Iron & Steel Company, Limited, was blown in again on April 4, after a break due to operations being suspended in 1942 at the direction of the Iron and Steel Control, the workpeople being diverted to basic iron plants. The furnace has a capacity of 1,000 tons of pig-iron weekly, ironstone being obtained from the company's mines at Loddington, some three miles distant. A casting bay covering an area of a quarter of an acre was erected during the war. The company was founded about 75 years ago as the Cransley Iron Company, its name being changed to its present style some 60 years ago. It is interesting to note that many of the original customers in the 1870's still appear on the books to-day, although they may have changed their identity through the passage of years.

CRUCIBLE FURNACES FOR NON-FERROUS METALS

"POLFORD"
REGISTERED

RAPID MELTING HOPPER ACTS AS PRE-HEATER GAS, COKE OR OIL FIRED
100 to 250 lbs. Capacity



MOTOR DRIVEN PUSH BUTTON OPERATED
100 to 1,250 lbs. Capacity

FLEXIBILITY OF CONTROL * LOW FUEL CONSUMPTION

SOLE AGENTS

THOS. W. WARD, LIMITED. Albion Works. Sheffield
TELEPHONE: 26311 TELEGRAMS: FORWARD SHEFFIELD

COMPANY RESULTS

(Figures for previous year in brackets.)

Colvilles—Final dividend of 5%, making 8% (same).

Walmsleys (Bury)—Interim dividend of 6% (same).

Herbert Morris—Interim dividend of 5%, tax free (same).

Quirk, Barton—Final dividend of 6%, making 8½% (same).

A. Reyrolle—Final dividend of 7½%, making 12½% (same).

Dunswart Iron & Steel Works—Interim dividend of 4% (same).

Projectile & Engineering—Final dividend of 7½%, making 15% (20%).

Craven Bros. (Manchester)—Final dividend of 15%, making 20% (same).

G. Beaton & Son—Dividend of 10% (same) and a bonus of 5% (same).

North Lonsdale Iron & Steel—Profit for 1945, £5,073; forward, £9,070.

James H. Lamont & Company—Final dividend of 20%, making 25% (same).

Sanbra—Final dividend of 5% and a bonus of 2½%, making 12½% (same).

Vactric—Payment of an ordinary dividend is omitted. (Last year 22½% was paid.)

Humphreys—Trading profit to November 30, £5,381 (£36,998); dividend of 12½% (10%); forward, £35,079 (£51,122).

Superheater Company—Final dividend on the ordinary and "A" ordinary shares of 27½%, making 42½% (40%).

Samuel Marsden & Son—Loss to July 31 last, £8,543 (profit of £10,004); previous year's debenture interest, and 1½ years' preference dividend paid to December 31, 1939.

Blaenavon Company—Net profit for 1944, £54,225 (£94,831); to depreciation, £26,431 (same); forward, £117,370 (£895,575); no payment of arrears of preference dividend.

R. W. Crabtree & Company—Net profit, £42,394 (£37,519); preferred ordinary dividend of 12½% (same); ordinary dividend of 8% (same) and a bonus of 5% (2%), payable out of the capital reserve; forward, £85,570 (£59,663).

Midland Electric Manufacturing—Net profit for 1945, £61,948 (£48,423); to development reserve, £20,000 (same); to general reserve, £20,000 (same); ordinary dividend of 15% (10%) and a bonus of 15% (same); forward, £35,687 (£35,820).

Blythe Colour Works—Net profit for 1945, after providing £41,441 (£29,967) for tax and N.D.C., £42,759 (£26,426); ordinary dividend of 50% (30%) and bonus of 15%, tax free (nil); to reserve, £8,000 (£6,000); forward, £14,381 (£12,621).

John Oakey & Sons—Net profit for 1945, £35,368 (£37,975); final dividend of 10%, making 12½%, together with a dividend of 12½% on the issued employees' shares; to general reserve, £5,000 (same); forward, £11,295 (£11,430).

General Engineering Company (Radcliffe)—Trading profit to November 30, £34,843 (£38,260); net profit, after tax, depreciation and directors' fees, £10,255 (£9,050); to reserve, £2,000 (same); dividend of 20% (same); forward, £12,598 (£11,493).

Hammond Lane Foundry—Profit for 1945, after charging all expenses, including depreciation, and after provision for taxation and contingencies, £13,469; ordinary dividend of 7% and a bonus of 2½%; to general reserve, £4,000; forward, £2,227.

Thos. Firth & John Brown—In declaring an interim dividend of 4½%, tax free, the directors state that it is not expected that any further dividend will be recommended. This makes a total of 7½%, tax free, for 1945, and compares with a final of 5½%, tax free, a year ago, making 10%, tax free, for 1944.

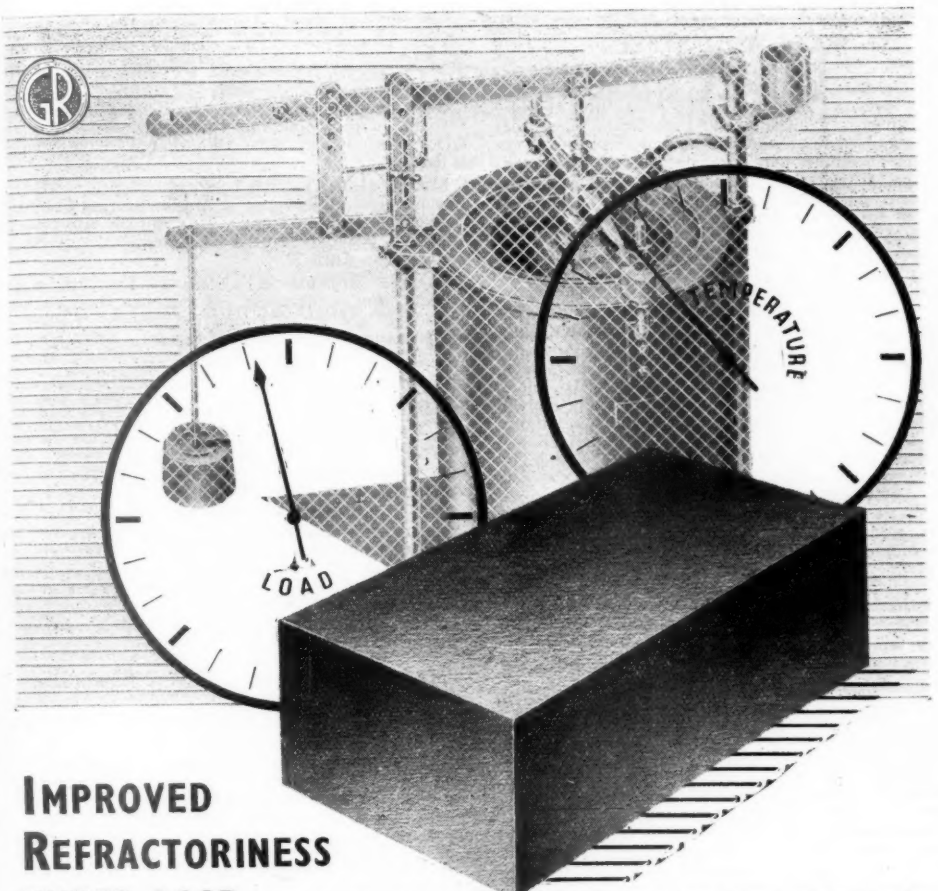
Josiah Parkes & Sons—Trading profit for 1945, £46,715 (£37,810); depreciation, £5,028 (£4,841); to staff pension scheme, £3,532 (£3,566); provision for taxation, £22,706 (£14,646); final dividend of 6%, making 10% (same); to taxation reserve, £8,000 (nil); to general reserve, nil (£8,000); forward, £10,161 (£10,213).

Guest Keen Baldwins Iron & Steel—Profit for 1945, including dividend by a subsidiary company, but after taxation and provision for deferred repairs, £749,523 (£693,282); to depreciation, £375,000 (same); debenture interest, £82,800 (£83,942); debenture stock redemption, £29,700 (£28,558); net profit, £219,163 (£164,990); ordinary dividend of 7½% (6%); forward, £154,939 (£112,640).

Clayton Dewandre—Trading profit for 1945, after deferred repairs and E.P.T., £80,762 (£80,367); income-tax, £23,350 (£26,350); written off plant, etc., £15,860 (£16,933); directors' fees, £1,000 (same); interest, £1,416 (nil); net profit, £39,037 (£35,984); final dividend of 6%, making 10% (same); to general reserve, £7,500 (same); undivided profits account, £2,000 (nil); forward, £17,972 (£15,736).

Gibbons (Dudley)—Net profit for 1945, after providing for taxation and depreciation, £34,268 (£30,664); ordinary dividend of 10% (same) and a bonus of 5% (same); written off buildings and plant, £3,000 (same); to reserve for deferred renewals and repairs, £10,000 (same); to general reserve, £5,000 (same); to reserve for proposed employees' benefit funds (first contribution), £3,344; forward, £21,781 (£21,888).

English Steel Corporation—Trading profit for 1945, £879,700 (£1,423,612); to depreciation, £350,000 (same); debenture stock interest, £58,579 (£59,838); provision for income-tax, £274,313 (£773,686); provision for possible fall in value of stocks, etc., £55,812 (£100,000); net profit, £323,373 (£310,783); to reserve, £10,231 (£2,365); to debenture stock sinking fund, £22,243 (£20,984); dividend of 17½%, tax free (same); forward, £198,165 (£187,123).



IMPROVED REFRACTORINESS UNDER LOAD

AT HIGH TEMPERATURES

The load-bearing properties of refractory products assume ever greater importance in the design of furnace structures. This arises from the insistent demand for more efficient furnace operation and increased outputs, which entails the use of higher temperatures and heavier loads. General Refractories' products keep abreast of all requirements by the operation of a system of strictly controlled processing in which importance is placed upon raw material selection, grading and high temperature firing. Widely used throughout the country and overseas, G.R. products provide a complete answer to the vital need for strong, stable, and lasting furnace linings.

Advice on the selection and application of refractories is available on request.

FIREBRICKS · BASIC BRICKS
ACID-RESISTING MATERIALS
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Raw Material Markets

IRON AND STEEL

There is considerable pressure on the furnaces for the best grades of pig-iron for the general engineering and speciality foundries. The production of high-duty castings is increasing and considerable quantities of low- and medium-phosphorus iron, as well as refined and hematite pigs, are needed. Strong conditions prevail in the light foundry trade, demand being very keen, particularly in connection with housing. Stocks of high-phosphorus iron are low and care on the part of the Control to secure equitable distribution is necessary.

One of the post-war problems of the steel industry is to attain self-sufficiency in regard to the supply of semi-finished material. In the pre-war years the re-rolling industry made extensive use of cheap Continental billets, sheet bars, etc., which are now no longer obtainable. Latterly bigger tonnages have been provided by British steelmakers, but there is still a gap to be bridged and other sources are being tapped to make good the deficiency. Sheet mills are more favourably situated than the rollers of light sections, etc. Small billets are definitely scarce and wire mills maintain constant pressure for supplies.

Steel plates figure conspicuously in the list of exports, and as there is also a heavy home demand, particularly from the shipyards and the locomotive and wagon builders, the mills are confronted with an accumulating weight of orders which will keep them fully occupied until the late summer. Light and heavy sections, joists and channels are also freely specified. In the sheet trade the overseas demand is clamant, but very few export orders can be accepted owing to the urgency of the home demand.

NON-FERROUS METALS

Copper supplies are reaching working up plants fairly well and should continue to do so, although it is not easy to look too far ahead. The Government has recently purchased supplies of Chilean copper and deliveries are likely to commence shortly.

Tin consumption tends to expand, but current needs are being covered as far as important users are concerned. Speaking of the rehabilitation of the Malayan tin industry, Mr. C. J. Pyke, Economic Adviser to the Malayan Union Government, recently stated that three years will pass before the pre-war tin output is reached.

The zinc supply situation is quite comfortable, adequate stocks being held. Consumption may be expected to increase, but there should be little difficulty in coping with developments. Lead supplies, on the other hand, are distinctly light; the effect of this on the housing programme has been the subject of a number of questions in the House of Commons.

Following the announcement of increased prices of copper, zinc and lead, the Minister of Supply has issued a revised list of prices of non-ferrous scrap metals.

NEWS IN BRIEF

TEN EMPLOYEES, each with at least 50 years' continuous service with Mechans, Limited, manufacturing engineers, founders, etc., of Glasgow, have received presentations.

THE GROVESEND STEEL & TINPLATE COMPANY, LIMITED, is to be wound up voluntarily. Mr. T. Griffiths, "Dormers," Ashley Road, Walton-on-Thames, Surrey, is the liquidator.

MR. W. H. ROYALL has been appointed East Midland area manager of Ransome & Marles Bearing Company, Limited, Newark-on-Trent. The company will open an office at Nicholas House, 4, Great Central Street, Leicester, on April 22.

CHARLES ROBERTS & COMPANY, LIMITED, wagon builders, ironfounders, etc., of Horbury Junction, near Wakefield, are to issue the outstanding balance of ordinary shares in the ratio of 11 shares of £1 each for each £100 of ordinary stock held.

THE MINISTER OF SUPPLY (Mr. J. Wilmot) denied in the House of Commons that any restrictions were imposed on the manufacture of steel sheets within the limits of the material and labour available for the purpose. They were doing all they could to increase supplies. Questioners had suggested that supplies of domestic hardware were affected by alleged restrictions.

FROM THE OUTBREAK OF WAR to the end of 1945 Birmingham Small Arms Company, Limited, were responsible for an output worth more than £135,000,000, said Sir Bernard D. F. Docker, chairman, at the recent annual meeting. During their busiest period they were employing 50,000 people, working in more than 80 places, responsible for eight separate shadow-factory schemes.

MACHINE-TOOL ADVISORY COUNCIL

The Minister of Supply has set up a Machine-tool Advisory Council to provide a means of regular consultation between the Government and the machine-tool industry on matters concerned with the maintenance of an adequate and healthy British machine-tool industry in the interests of national defence and industrial efficiency. Mr. S. F. Steward, until recently Director-General of Machine Tools in the Ministry of Supply, has been appointed the official chairman of the Council. A similar council, working closely with the Machine-tool Advisory Council, will be established to deal with the gauge and tool industries.

PRICE OF ALUMINIUM REDUCED

The Minister of Supply announces that as from April 10 the price of virgin aluminium in ingot or notch bar form has been reduced from £85 to £67 per long ton delivered into consumers' works. The new price applies to metal of a purity of 99 per cent. to 99.5 per cent. inclusive, with premiums for higher purities. This reduction in price is made possible by reason of a contract which has just been made by the Ministry for the purchase of 215,000 metric tons from Canada over the years 1946 and 1947.